Navy-Marine Corps-Army Engineers Win Top Awards for Energy Harvesting Innovation

By John Joyce, Naval Surface Warfare Center Dahlgren Division

DAHLGREN, Va. - Bionic power, solar panels, and the kinetic transducing Lightning Pack.

Eric South and Sara Lohmann talk about integrating these technologies on a human with the vision and enthusiasm of a Hollywood director.

However, they are not directing a movie or remaking the 'Bionic Man' television series.

The Naval Surface Warfare Center Dahlgren Division (NSWCDD) civilian engineers - along with their Army counterpart and a Marine officer - are envisioning thousands of Marines and Soldiers continually producing power, energy, and water while on the move.

Meanwhile, their project - Joint Infantry Company Prototype (JIC-P) - has the attention of big business.

Literally – BIG business.

The Business Intelligence Group (BIG) recently selected JIC-P for the 2016 BIG Innovation Award, announced the U.S. Marine Corp. Headquarters' Expeditionary Energy Office, who manages JIC-P, in February. BIG awardees are recognized for innovations that are making major impacts in today's world. The winning organizations have led the way to new advancements and dramatic accomplishments in a variety of fields.

What's more, a whopping number of international business leaders - 3,000 senior executives and academics - selected the project as a "best of the best" finalist for the 2016 Edison Awards, a program that honors the most innovative new products, services, and business leaders across the globe. Their votes acknowledge the finalists' success in meeting stringent quality standards. Award winners will be announced and ranked at the Edison Awards Annual Gala in New York City on April 21.

"We are proud to be recognized with the BIG Innovation Award and selection for an Edison Award," said Lohmann, NSWCDD lead engineer for JIC-P who ensures the system functions with Marine Corps technology. "It is a great testament to the team's dedication supporting the warfighter. We strive to lighten the load on the warfighter by providing efficient alternative sources of energy. It is an honor to work with this team on a joint services project."

The JIC-P technology features an electricity generating backpack and the Bionic Knee - a device worn over the knees that generates power as a person walks. Integrating these energy harvesting technologies into a personal power system significantly increases the warfighters' ability to generate, manage, and store their own electricity during dismounted operations.

This central power source in a vest can power common electronics and gear such as radios, night-vision goggles, global positioning system, laptops and universal serial bus powered equipment.

"Joint Infantry Company Prototype is a great example of multiple agencies in different services working together," said South, NSWCDD technical lead for JIC-P. "As an engineer, it's a very rewarding experience to see your efforts come to fruition and actually see Marines use the system. We're not done yet but have come a long way from just an idea, to something that can be worn, held, and used to benefit troops in tough situations and hard to reach places."

The project - sponsored by the Office of Secretary Defense Operational Energy Plans and Policies - is the culminating effort of several years of work within the Department of Defense aimed at increasing the electrical energy sustainment of dismounted infantry.

"This effort will provide the Marine expeditionary rifle companies with a unique, self-sustainable capability that enables dismounted multi-day operations in an austere environment," said Marine Capt. Anthony Ripley, science and technology lead at the U.S. Marine Corps Expeditionary Energy Office. "The program includes a company concept of operation development, modeling, technology development, integration and large-scale testing and evaluation."

It also includes warfighter feedback.

Last summer, a team of U.S. Army Rangers evaluated the JIC-P system's electricity generating backpack - dubbed the "Lightning Pack" - throughout a 12-mile march held at the U.S. Army Natick Soldier Research and Development Center (NSRDC) in Fort Benning, Ga.

Noel Soto - the Army's JIC-P technical lead who partners and works collaboratively with South, Lohmann, and Ripley - collected the empirical data and Soldiers' qualitative feedback of the Lightning Packs during the march. The data is being used to improve functional and ergonomic human factors aspects of the pack and other JIC-P components.

"Their direct feedback is what goes into the system design and improvement," said South.

The user evaluations and data verify that JIC-P components - high efficiency solar panels, vest-worn power managers, a bionic power knee harvester, and the Lightning Packs - are effective.

The Marines and Soldiers reported that they can operate farther, longer, and lighter with less spare batteries and logistical re-supply.

Moreover, the project's leaders believe Marines and Soldiers can operate safer.

"Marines have become critically dependent on fuel, battery, and water resupply," said Ripley. "This dependence has resulted in increased personal risk on the battlefield, especially for those Marines, Soldiers, and civilians hauling fuel and water."

Lohmann, South, Soto, and Ripley – and the warfighters evaluating JIC-P – are convinced its integrated energy harvesting and water purification capabilities will dramatically reduce that personal risk in austere locations and on the battlefield.

USMC Expeditionary Energy Office and its partners - NSWCDD, NSRDC, Project Manager Soldier Warrior (within Program Executive Office Soldiers), and Marines – will be evaluating JIC-P technology throughout fiscal year 2016 and perhaps into fiscal year 2017.